



STRENGTHENING OF REINFORCED CONCRETE BEAMS FOR CYCLIC LOADING WITH SHORT CARBON FIBRE REINFORCED POLYMER PLATES

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Abstract:

This paper presents the cyclic performance of five reinforced concrete (RC) beams externally strengthened in flexure with two different lengths and anchorage systems of carbon fibre reinforced polymer (CFRP) plates. The testing programme consists of four strengthened beams with plate lengths of 50 and 80 percent of the beam span which is equivalent to 25 and 70 percent of the shear span. The strengthened beams were anchored with single and double layers of U-wraps CFRP composite sheets at the plate ends and midspan and tested under cyclic loading till failure. One unstrengthened beam specimen was tested under monotonic loading to serve as a control specimen. The applied cyclic load, the corresponding midspan deflection response along with the associated failure modes were recorded and discussed. The results showed an increase in the overall strength of the strengthened specimens ranging from 20 to 105 percent of the unstrengthened beam specimen depending on the plate's length and number of U-wrap CFRP layers. It can be concluded from this study that the ratio of the CFRP plate length to the beam shear span has a major effect on the performance of FRP-strengthened RC beams in flexure when subjected to cyclic loading.

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